

Preservice Teachers' Preparedness and its Influence on Microteaching

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Abstract

Preservice teachers undergo training to develop their skills for classroom teaching. Microteaching, a teaching technique, is employed to enhance their preparedness of teaching and be confidence on this practice. Preparation is assessed based on various aspects of teaching knowledge, including teaching methods, teaching approaches, and teaching strategies. The evaluation of microteaching preparedness among preservice teachers is crucial for universities and training institutions. The primary objective of this study is to investigate the preparedness of preservice teachers and to examine the extent of their preparedness influences their skills in teaching approaches, teaching methods, and teaching strategies. A survey was conducted among preservice teachers specializing in mathematics at a public university. Forty-two university mathematics education majors were chosen at random to take part in the study. The collected quantitative data were analyzed using descriptive and inferential statistics. Specifically, a correlation analysis was performed to observe the relationship between the level of preparedness and the effectiveness of teaching pedagogy, including teaching approaches, teaching methods, and teaching strategies. The findings of the study revealed that the preservice teachers demonstrated a significant relationship between their level of preparedness and their teaching approach, teaching method, and teaching strategy, hence highlighted the preparation before microteaching is a crucial component in teaching training.

Keywords: Preservice Teacher, Microteaching; Preparedness, Teaching Approaches, Teaching Methods, Teaching Strategies

Introduction

Teachers have significant responsibilities in the development of education, particularly during the pandemic (AlShannag et al., 2020; Răducu & Stănculescu, 2022). Other than challenges in terms of environment, they need to deal with students' difficulties in learning contents. Teaching mathematics is widely regarded as a challenging task due to the complex and abstract nature of the subject matter. Teachers hold a heavy responsibility to promote a

deeper understanding of mathematical concepts (Kilpatrick et al., 2001) as well as building connections among mathematical ideas (Hiebert et al., 1996). To facilitate student learning in mathematics, teachers need to equip themselves with the necessary knowledge and skills of teaching the subject, such as using questioning skills (Koskinen & Pitkäniemi, 2022; Ünal, 2017). The knowledge and skills of teaching are referred to as pedagogical techniques. Effective teaching in mathematics requires teachers to use a variety of pedagogical techniques to meet the needs of diverse learners (Ambrose et al., 2010; Kilpatrick et al., 2001). Specifically, the pedagogical techniques include the use of different approaches, methods, and strategies depending on the learning goals, the needs of the students, and the characteristics of the subject matter (Alam, 2020). By using a range of pedagogical techniques, teachers can promote student engagement, understanding, and success in mathematics. Preservice teachers must be well informed of this since creating awareness enables prospective teachers to be well-prepared (Toscano et al., 2019). Thus, there is a research gap in understanding the extent to which preservice teachers are prepared to use appropriate pedagogical techniques in their microteaching, particularly in the context of teaching mathematics. Studies have shown the importance of microteaching to educate preservice teachers (Al Malki et al., 2022; Bukamal, 2018). Therefore, this study aims to investigate the preparedness of preservice teachers in microteaching and how it promotes the use of approaches, methods, and strategies in the teaching of mathematics. This study seeks to contribute to the knowledge base on the effectiveness of microteaching as a preparation tool for future teachers in the field of mathematics education. Specifically, the findings were presented for the following objectives: (1) To identify preservice teachers' levels of effective microteaching in terms of teaching approach, teaching method, and teaching strategy, (2) To identify preservice teachers' level of preparedness before microteaching, (3) To investigate relationship between level of preparedness and teaching approaches, teaching methods, and teaching strategies.

Microteaching

Teaching mathematics has become increasingly challenging, and teachers now have a greater obligation to ensure effective instruction and learning. Particularly, preservice teachers must be adequately prepared for this obligation. In mathematics education, classroom discourse has been identified as an essential component (Kooloos et al., 2022; Sedova et al., 2016; Walshaw & Anthony, 2008), and preservice teachers are strongly encouraged to engage in this process prior to graduation (Cohen et al., 2020). Therefore, microteaching is becoming increasingly significant as it provides a platform for their teaching improvement. Focusing on microteaching, the skills and values of mathematics should be the ultimate objective of any mathematics teacher. It was emphasized that these skills complement one another because students are motivated to improve their mathematics skills if they possess positive values towards the learning process and the subject being studied (Tang et al., 2021). On the other hand, the mathematics curriculum frameworks define key elements for developing students' skills and values in mathematics processes (AlShannag et al., 2020; Ministry of Education Malaysia, 2019).

As depicted in Figure 1, achieving this objective necessitates integrating pedagogical techniques that promote students' skills within the learning content. Consequently, it is crucial to investigate how preservice teachers can prepare themselves for successful teaching of mathematics in microteaching. As shown in Figure 1, microteaching also requires the application of the mathematical process. Process mathematics, as described in the standard

curriculum document (AlShannag et al., 2020; Ministry of Education Malaysia, 2019), is a valuable tool that should be emphasised to help preservice teachers develop the necessary skills for teaching mathematics in the future by integrating pedagogical techniques to promote mathematical skills and values within mathematics learning contents.

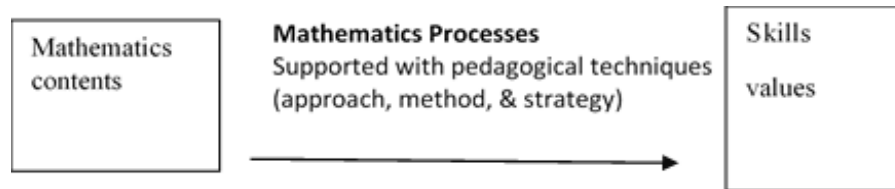


Figure 1. The requirement in a microteaching

In order to interact effectively with students when delivering mathematics content, preservice teachers are urged to comprehend the mathematical process (Ayuwanti et al., 2021). In teaching fractions, for instance, communication is used to engage students and promote collaboration, in addition to guiding them through representation to grasp fractional concepts and engage in problem-solving, which fosters mathematical skills and values collaboration with persistence.

In educational programmes, preservice teachers are guided in the development of the necessary skills and competencies. Many universities treated microteaching as a major tool in guiding preservice teachers to accomplish teaching endeavors (Msimanga, 2020) for guiding students through the mathematics process in the acquisition of mathematical abilities. The processes of reasoning, communication, representation, connection, and problem-solving in the classroom may need to be developed through microteaching before an individual is prepared to teach in a school setting. However, the complexity of the procedure and the difficulties of integrating theories into practices may necessitate explicit direction. The guidance intends to address the challenges associated with attaining competencies in a few aspects of teaching competencies, including content competencies, facilitating competencies, and environmental competencies (Nugraheni, 2019). It was also emphasized that all of these competencies must be considered when preparing learning materials to meet the challenges (Hammerness, 2005). Therefore, microteaching should be regarded as an essential instrument for achieving the teaching objective.

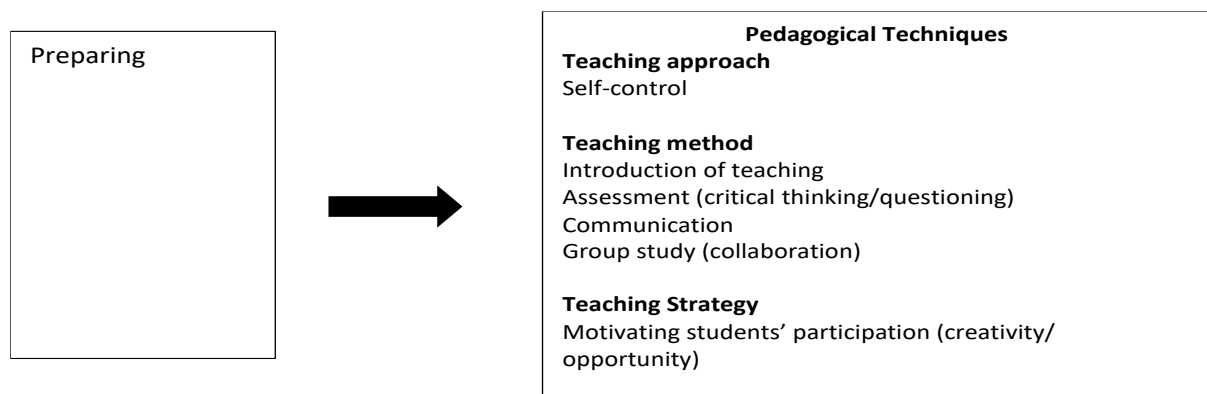


Figure 2. Pedagogical techniques in microteaching

Figure 2 provides a comprehensive overview of the instructional strategies employed in a microteaching class in order to be successfully engaging in the mathematics process. It emphasizes the crucial role of preparation in the development of effective teaching skills, which serve as the basis for the entire teaching process. The pedagogical instrument is subdivided into three components, namely (1) the teaching approach; (2) the teaching methods, which include the introduction of teaching, assessment through critical thinking and questioning, communication, and group study or collaboration; and (3) the teaching strategy, which aims to motivate students' participation by fostering their creativity and providing them with opportunities to engage in the learning process. The following sections explain further about these components.

Teachers' Preparation

Teachers who have good content knowledge are better equipped to deliver effective instruction and engage students in learning (Shulman, 1987). This is attributed to the truth that teachers who have a thorough comprehension of the subject matter are able to establish clear learning goals and objectives, design well-structured lessons, and provide accurate feedback on student progress. While good content knowledge can be developed through effective teacher preparation (Darling-Hammond, 2017), it is also essential for teachers to engage in ongoing professional development and collaboration with colleagues to continue to enhance their knowledge and skills (Hammerness, 2005). In addition to content knowledge, effective teaching requires a range of other competencies, such as pedagogical knowledge, communication skills, and classroom management, which can be developed through effective teacher preparation and ongoing professional development (National Council for Accreditation of Teacher Education, 2012).

Teaching Approach

A teacher's teaching approach is crucial in determining the roles of the instructor and the students in the classroom. It is highly dependent on their control over the instructional process. Briefly, it refers to a teacher's overall teaching philosophy or viewpoint on to what extent students take part or manage their learning (Bloom et al., 1999). This in turn includes teaching approaches in two perspectives, namely constructivist and behaviorist (Piaget, 1977; Skinner, 1974). The approaches are extremely dependent on how the instructors direct their instruction. Between the two approaches, constructivism is universally regarded as learner-centric and active learning than behaviorism. It promotes student engagement by allowing them to construct their own knowledge through hands-on activities, reflection, and collaboration. Teachers make greater endeavors to create such an environment using a variety of teaching methods. Behaviorism, on the other hand, is concerned with shaping specific behaviors using positive or negative reinforcement. Teachers should focus on monitoring the change in behavior by providing more appropriate input for this purpose.

The selection of an approach is highly dependent on teachers' control over the instructional process, which can be influenced by their personal characteristics such as self-control. Self-control is a personal characteristic that can impact a teacher's behavior and decision-making in the classroom (Tangney et al., 2004). For example, a teacher who exhibits self-control is able to manage his or her emotions, respond calmly to student behavior, and maintain a positive classroom environment (Kokkinos, 2007). These behaviors can in turn impact the teaching approach used by the teacher, such as their classroom management style or their ability to create a supportive learning environment.

Teaching Method

Teaching methods are observed to see how teachers use them to engage students. Based on a selected approach, either teacher-centred or student-centred teaching methods are implemented (TeachCom, 2020). Teaching methods are a crucial aspect of effective instruction, and they should be chosen based on the learning goals and needs of the students. In the realm of digital transformation, most of the classroom time is devoted to active student participation. Active student participation is essential for effective learning through developing students' attitude. Teachers should encourage students to ask questions, share their ideas, and work together to solve problems. This can help to deepen their understanding of the subject matter and develop important skills such as critical thinking, creativity, and communication (Bergmark & Westman, 2018).

Assessment should be an ongoing process that informs instruction and helps teachers gauge student progress. Different types of assessments, such as formative and summative assessments, can be used to measure different aspects of learning (Black & Wiliam, 1998).

Communication is a critical component of effective teaching. Teachers should strive to create a supportive and inclusive learning environment where all students feel valued and respected. This can be achieved through active listening, open dialogue, and positive feedback (Saab et al., 2005). Specifically, group study or collaborative learning can foster teamwork and encourage social learning.

Teaching Strategies

Teaching strategies involve specific actions to enhance students' understanding. By incorporating a variety of teaching strategies that address these factors, a teacher can create a more well-rounded approach to instruction that meets the diverse needs of their students. Hence, it provides opportunities for learning. Among the strategies are scaffolding strategy, listing, and using tabling strategies. Examples include completing fractional or decimal numbers in a number line to compare the values. These specific teaching strategies, such as scaffolding, listing, and tabling, offer tangible ways to enhance students' understanding and engagement. By incorporating these strategies into their instructional approach, teachers create opportunities for students to actively participate in their learning and develop critical thinking and problem-solving skills. In teaching mathematics, interactively using strategies of scaffolding contributes to strong cognitive development in learning mathematics. Nevertheless, teachers need to thoroughly manage students within a socialized context, such as organizing good communication and questioning, since the development of cognition involves society. In other words, social interaction plays a role in forming conceptual understanding (Vygotsky, 1986).

Methodology

This study employed a survey research design to gather quantitative data. A questionnaire was distributed to 42 mathematics preservice teachers. The target population is all mathematics preservice teachers (A total of 140 students) who had taken microteaching courses in a public university. A simple random technique was used by selecting at least thirty samples; in this study, forty-two samples were chosen. This number was sufficient to promise that the distribution of the sample means approximately a normal distribution (Hogg et al., 1977). The questionnaire consists of three dimensions, namely teaching approach, teaching method, and teaching strategy. The scales used in the questionnaire items range from '1' with value of strongly disagree to '5' with value of strongly agree. It was adapted from a study done

by Basturk (2016). The modification of this instrument was validated by an expert at a public university. The reliability test indicated Cronbach's alpha of 0.973 for the total items of 32. Examples of the items in the questionnaire are listed in Table 1.

Table 1

Some items from the instrument

Dimension	item
Preparedness	<ul style="list-style-type: none"> • I can prepare a number of materials for teaching. • I can make preparation process before teaching.
Teaching Approach	<ul style="list-style-type: none"> • I am able to develop an attitude towards criticism. • I am able to control excitement.
Teaching Method	<ul style="list-style-type: none"> • I am able to associate teaching with students' previous knowledge and experiences. • I am able to use alternative assessment techniques. • I am able to make appropriate emphasis where necessary. • I am able to well-organize group study.
Teaching Strategy	<ul style="list-style-type: none"> • I am able to ask students questions suitable to their levels. • I am able to start teaching with a remarkable or motivated activity.

The data were analyzed according to the research questions below:

Research Question One: What are the preservice teachers' perceived levels of effective teaching in terms of teaching approach, teaching method, and teaching strategy?

Research Question Two: What are the preservice teachers' perceptions of their preparation before microteaching?

Research Question Three: Is there any relationship between preservice teachers' perceived levels of preparation before microteaching and levels of effective teaching in terms of teaching approach, teaching method, and teaching strategy?

Findings

The findings were presented according to the three research questions which align with the research objectives, namely: (1) To identify preservice teachers' levels of effective microteaching in terms of teaching approach, teaching method, and teaching strategy, (2) To identify preservice teachers' level of preparedness before microteaching, (3) To investigate relationship between level of preparedness and teaching approaches, teaching methods, and teaching strategies.

Finding 1: Preservice teachers' perceived levels of effective microteaching

Research Question One: What are the preservice teachers' perceived levels of effective teaching in terms of teaching approach, teaching method, and teaching strategy?

Table 2 shows the preservice teachers' perceptions on their contribution in micro teaching. They rated their levels of effective teaching averagely high with a rating of 4.1488 (0.5218). Specifically, the level of teaching approach (mean=4.0238, standard deviation=0.5942), teaching methodology (mean=4.1717, standard deviation=0.5942), and teaching strategy

(mean=4.1619, standard deviation=0.5212) are close to each other. Thus, they were confident in their teaching effort especially on teaching method and teaching strategy. Their ratings were reported as achieving high agreement on their ability in performing all the pedagogical aspects (teaching approach, teaching method, and teaching strategy) since they were rated at more than '4' out of rating '5'.

Table 2

Preservice teachers' perceived levels of effective microteaching

	Mean	Std. Deviation	N
Teaching Approach	4.0238	0.5942	42
Teaching Method	4.1717	0.5942	42
Teaching Strategy	4.1619	0.5212	42
overall	4.1488	0.5218	42

Finding 2: Preservice teachers' perceived levels of preparation for their microteaching

Research Question Two: What are the preservice teachers' perceptions of their preparation before microteaching?

Table 3 shows the preservice teachers' perceptions on their preparation for microteaching. They rated averagely high with a rating of 4.2642. They perceived their level of preparedness for microteaching descriptively high with mean of 4.2202 (standard deviation = 0.6745). Similarly, the level is interpreted high since it informs 'agree' on all the efforts in the preparation for microteaching.

Table 3

Preservice teachers' perceived levels of preparedness

	Mean	Std. Deviation	N
preparedness	4.2202	0.67445	42

Finding 3: Relationship between preservice teachers' perceived levels of preparation before their microteaching and levels of effective teaching in terms of teaching approach, teaching method, and teaching strategy?

Research Question Three: Is there any relationship between preservice teachers' perceived levels of preparation before microteaching and levels of effective teaching in terms of teaching approach, teaching method, and teaching strategy?

Table 4 shows preservice teachers' perceived levels of preparation before microteaching has relationship with levels of effective teaching in terms of teaching approach, teaching method, and teaching strategy. The correlation has a higher relationship between preparedness and teaching method and strategy with correlation coefficient of 0.774 and 0.725 respectively with significant level less than 0.001. Besides, Table 4 shows moderate correlation between preparedness and teaching approach with correlation coefficient of 0.565. It further illustrates the relationship between teaching method and teaching strategy is strongly positive with correlation coefficient of 0.782, and significant level of less than 0.001. This relationship has supported the relationship between these two factors (teaching method and teaching strategy) and relationship between preparedness and teaching method and teaching strategy respectively.

Table 4

Correlations between preparedness and other factors namely teaching approach, Teaching method, and teaching strategy

		Preparation	Teaching Strategy	Teaching Approach	Teaching Method
Preparation	Pearson Correlation	1	.725**	.565**	.774**
	Sig. (2-tailed)		<.001	<.001	<.001
	N	42	42	42	42
Teaching Strategy	Pearson Correlation	.725**	1	.718**	.782**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	42	42	42	42
Teaching Approach	Pearson Correlation	.565**	.718**	1	.793**
	Sig. (2-tailed)	<.001	<.001		<.001
	N	42	42	42	42
Teaching Method	Pearson Correlation	.774**	.782**	.793**	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	42	42	42	42

** . Correlation is significant at the 0.01 level (2-tailed).

The preservice teaching rated their contribution of microteaching almost equally in their preparation of their microteaching. They also rated their performance of teaching approach, teaching method, and teaching strategy in a higher rating. Thus, it showed that the preservice teachers contributed well to their microteaching for these aspects.

Discussion

The findings indicated that preservice teachers, on average, perceive their contribution in microteaching to be moderately effective, with a mean rating of 4.1356. This indicates that they generally feel confident about their teaching abilities in the context of microteaching. Particularly, they have a similar level of confidence in teaching approach, teaching method, and teaching strategy. Besides, preservice teachers, on average, perceive their level of preparation before engaging in microteaching to be moderately high, with a mean rating of 4.2642. This indicates that they generally consider themselves adequately prepared before microteaching sessions. As a result, the findings supported that common practice of microteaching focusing on students' efforts successfully build preservice teachers on their awareness of microteaching (Ima Isnaini, 2021). With better preparation, preservice teachers perceive positively towards their teaching in terms of teaching approach, teaching methods, and teaching strategies. Readiness from the basis of preparation was highly emphasized in previous studies (Ferguson & Sutphin, 2022). Effective preparation provides exceptional results in teaching, especially enhancing preservice skills such as communication, critical thinking and problem solving (Popovich & Katz, 2009). Hence, microteaching as a training

procedure must get more attention among teachers' training institutions. In addition, this study found that preparation among preservice teachers contributed to the effective teaching in teaching approach, teaching method, and teaching strategy. Hence, focusing on preparation is important as highlighted in the previous studies (Ferguson & Sutphin, 2022; Ima Isnaini, 2021).

Conclusion

This study brings in a big picture that to what extent courses of microteaching offered in educational programmes, preparation should be emphasized to enhance and build preservice teachers' confidence. The implication of this study informs that mathematics preservice teachers are required to be more prepared before their microteaching by equipping themselves with the content knowledge, teaching pedagogical knowledge such as teaching approach, method, and strategies, and better prepared for the materials to be used for their microteaching.

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